Space Weather Forecast

Issued on Sunday, 30 April 2023 at 01:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of R1 Minor - R2 Moderate radio blackouts throughout. Slight chance of G1/Minor geomagnetic storms, mainly day 3 (2 May).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low in the past 24 hours, with occasional Common-class flares, with the largest event a higher level Common-class flare originating from the largest sunspot region located just west of centre disc in the southern hemisphere. There are currently five numbered sunspot regions on the visible disc. The largest and most complex region on the disc remains the spot group located in the southwest quadrant. The other most noteworthy group is a moderately large and complex region in the northeast quadrant which has seen continued slight growth in its northern spots. The other numbered regions are small and more simple at present.

There have been numerous mainly weak and faint eruptions appearing in coronagraph imagery in the last 24 hours. Generally speaking, any Coronal Mass Ejections (CMEs) are considered most likely to miss Earth, although some glancing influence from several different sources cannot be ruled out in the coming days. As a result, the forecast should be considered of lower than average confidence at present. Meanwhile, an eruption which occurred at 29/0400 UTC near the vicinity of the largest sunspot region in the southwest produced a CME. This CME was modelled with the northern flank perhaps glancing Earth later on day 3 (2 May).

Solar Wind / Geomagnetic Activity: The solar wind was reflective of continuing coronal hole fast wind enhancement. The wind speed was strong, mainly between 580-720 km/s, declining a little to Elevated levels in recent hours. The Interplanetary Magnetic Field was weak, with the north-south component mostly weakly southward directed. Geomagnetic activity was predominantly Unsettled to Active (Kp 3-4).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to remain Low, with a chance of reaching Moderate levels through the coming days.

Solar Wind / Geomagnetic Activity: There have been numerous mainly faint filament eruptions appearing in coronagraph imagery over the past few days. These various CMEs have been largely directed away from Earth, but with the possibility of some glancing influence at various times throughout the forecast period. The most likely CME to glance Earth was emitted early on 29 April from near the large sunspot region in the southwest and has been modelled, with the northern flank perhaps glancing Earth later on day 3 (2 May).

Otherwise, the current fast winds from a coronal hole are expected to start to ease into Day 1

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(30 Apr). A further coronal hole currently in the northwestern disc, may prolong wind speeds into Days 2 and 3 (01-02 May) before a sustained reduction.

Geomagnetic activity is expected to be Unsettled to Active, with a slight chance of isolated G1/Minor Storm intervals, both on day 1 under waning coronal influence, and perhaps also on day 3 due to possible glancing CME interaction. Otherwise, activity should gradually subside through the period.

Energetic Particles / Solar Radiation: Overall no solar radiation storms are expected, but there is a slight chance of a storm occurring, mainly due to the westward progression of the largest spot.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	5	20	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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